

Notes from Follow-Up Correspondence with Duke Energy Regarding Data Submittal

The following documents all of EPA's follow-up correspondence with Duke Energy regarding the data that Duke Energy submitted to EPA on March 28, 2014 (DCN SE04360) in response to EPA's request that was sent on January 27, 2014 (DCN SE04333). The request and responses covered flue gas desulfurization (FGD) and bottom ash data from several Duke Energy power plants.

On May 8, 2014, EPA provided Duke Energy with a list of 20 questions specific to the submitted data on Miami Fort (DCN SE04331A1). EPA, ERG, and Westat participated in a call with Duke Energy on May 15, 2014 to discuss the list of follow-up questions.

The following people participated in the call:

EPA Personnel	Duke Energy Personnel	ERG Personnel	Westat Personnel
Ron Jordan	Nathan Craig	TJ Finseth	Yan Zhuang
Phillip Flanders	Joe Potts	Dan-Tam Nguyen	
Cuc Schroeder	Bill Kennedy		
	Brandon Delis		
	Jennifer Stenger		

The following questions were discussed during the call, with Duke Energy's responses described after each question.

Questions Regarding Arsenic Data

1. Confirm 200.8 self-monitoring data used a collision cell or dynamic reaction cell.

Duke Energy Response: Duke Energy confirmed that the ICP/MS was used with a collision reaction cell (CRC) for Method 200.8. Duke Energy is not sure which type of reaction gas was used for the analyses.

2. Why is the RL for the 200.8 self-monitoring data at 20 ug/L or higher?
 - a. Why not analyze samples to achieve lower RLs, given that clearly was possible (see EPA and industry results for dates of EPA sampling and 308 sampling)?
 - b. Why was the plant/laboratory able to measure at low enough levels to report a detect at 4.34 ug/L on 6/28/11, but weeks preceding and following are all ND at 20 ug/L? (Also note that the RL is listed as 20 ug/L on that date.)

Duke Energy Response: In July 2009, Duke Energy conducted an initial screening of the FGD wastewater for Outfall 608 in response to the "monitor and report" limits included in the plant's NPDES permit. Because the plant did not have specific numeric limits, the laboratories determined that 20 ug/L was an appropriate reporting limit to meet the NPDES permit requirements while maintaining appropriate QA/QC requirements. Duke Energy was not required to meet a lower reporting limit, so they used the 20 ug/L suggested by the laboratory.

Duke Energy stated that the sample result reported for 6/28/2011 was associated with a sample that was sent to a laboratory for sample analysis. Duke Energy believes that this value may be a J value, but will confirm with the laboratory. Duke Energy noted that they experience fairly high TDS values in their FGD systems, which makes it more difficult for the laboratories to analyze without further diluting the samples. The sample dilutions drive up the reporting limit. EPA indicated they were able to analyze samples at low concentrations during the EPA sampling event at Miami Fort and that the split samples collected and analyzed by UWAG were also at equally low concentrations, even with the high TDS wastewater. Duke Energy stated that the laboratory has set a dilution factor to achieve the 20 ug/L reporting limit and has not made changes to their analytical approach of the samples to achieve lower reporting limits. Duke Energy stated that this approach may not be the lowest level achievable by the laboratory.

Action Item: Duke Energy will confirm with the laboratory whether the 6/28/2011 sample result of 4.34 ug/L is a detected value or a J-value.

3. Why are there multiple results for each day on 7/13/10, 7/14/10, 7/15/10, 7/16/10, 9/28/10, 11/2/10, 12/7/10, & 1/14/11? Would it be appropriate to average the results for each day to obtain a single daily value?

Duke Energy Response: Duke Energy noted that the dates were during the EPA sampling event and the EPA CWA 308 monitoring events, where the facility took split samples and sent them to several different laboratories for analyses. Duke Energy provided the individual values to show the variation between the different laboratories. In the comments, UWAG provided average result for Unit 7 and 8, but Duke Energy wanted to show different values for the FGD units and between the laboratories. Duke Energy does not think it is appropriate to average the values for each day. Duke Energy confirmed that for 12/7/2010, the non-detect result at 20 ppb came from the laboratory that had already set their MDL at 20 ppb, whereas, the other sample results were able to detect the samples at much lower values.

4. Please explain the observations reported for 5/8/13 (5, 5, 46, and 500 ug/L). Clarify which results are D or ND (inconsistency between comments and the data table).

Duke Energy Response: Duke Energy noted that they conducted a round robin analysis of a single sample, where they sent four presumably identical samples to four different laboratories and asked each laboratory to analyze the sample using Method 200.8 the way the laboratory normally analyzes FGD wastewater. Duke Energy stated that they provided minimal direction to the laboratories and requested the laboratories conduct the analyses following their individual laboratory's normal protocol for analyzing samples using Method 200.8. Duke Energy noted that the 500 ug/L non-detect result was based on the laboratory's capability to analyze the sample and meet QA/QC requirements. Duke Energy noted that all laboratories included in the round robin were state-certified laboratories. Duke Energy stated that the variability in the results shows that more direction is needed to provide consistent procedures to analyze these types of wastewater using Method 200.8. EPA noted that both EPA and EPRI have developed standard operating procedures (SOPs) for analyzing FGD wastewater using Method 200.8, yet Duke Energy did not direct the laboratory to use either of the SOPs. Additionally, EPA noted that Duke Energy did not require the laboratories to use a collision or reaction cell for the analysis.

During the call, EPA also noted that they identified a discrepancy between the arsenic results for July 31 and August 1, 2012 that were reported in Duke Energy's comments (Table A-6) and the analytical data table that Duke provided on March 28, 2014. In Duke Energy's comments, the arsenic values were reported as nondetects at 10 ug/L; however, in the analytical data table the arsenic values were reported as nondetects at 20 ug/L.

Duke Energy Response: Duke Energy stated that they need to locate the laboratory reports to determine which value is correct.

Action Item: Duke Energy will locate the associated laboratory reports and determine which arsenic values are correct.

5. Please provide the laboratory reports for the arsenic data in the "USEPA Analytical Data Table MFS #26_14.xlsx" file for the following dates (these reports were not included in the disk): 7/13/2009, 8/3/2009, 9/1/2009, 10/5/2009, 11/2/2009, 12/1/2009, 1/5/2010, 2/2/2010, 3/2/2010, 4/6/2010, 5/4/2010, 6/1/2010, 7/6/2010, 7/12/2010, 7/13/2010, 7/14/2010, 7/15/2010, 7/16/2010, 8/3/2010, 9/7/2010, 9/28/2010, 10/5/2010, 11/2/2010, 12/7/2010, 1/14/2011, 6/28/2011, 6/28/2011, 3/6/2012, 7/31/2012, 8/1/2012, 8/8/2012, 8/9/2012, and 5/8/2013.

Duke Energy Response: Duke Energy stated that they will look for the laboratory reports, but they noted that they do not have access to UWAG's laboratory reports. To pull the remaining lab reports, Duke would need to check the dates against the project number and obtain the lab reports using the project number, which will take some time. Duke Energy wants to confirm that EPA only wants sample results from certified laboratories. EPA confirmed that they only wanted results from certified laboratories and asked that Duke Energy identify all results that are from uncertified laboratories.

Action Item: Duke Energy will provide additional laboratory reports for the dates for which they have laboratory reports.

Mercury

6. Confirm that data submitted by UWAG are repeats of the data reported by Duke Energy (and not laboratory analyses of split samples)

Duke Energy Response: Duke Energy indicated that the numbers reported are the same ones that UWAG provided (i.e., they were not split samples).

7. Apparent data entry errors where the spreadsheet is offset by one day from the data previously submitted in comments by Duke Energy and UWAG. Which date is correct? (See 8/3/09, 8/4/09...10/1/09, 10/2/09...11/2/09, 11/3/09... 6/1/10, 6/2/10...7/1/10, 7/2/10...8/2/10, 8/3/10...9/1/10, 9/2/10...10/4/10, 10/5/10...1/4/11, 1/5/11...3/1/11, 3/2/11...4/4/11, 4/5/11...8/30/11, 9/2/11)

Duke Energy Response: Duke Energy allowed for one day of hydraulic residence time in the equalization tank between sampling the FGD influent and the FGD wastewater treatment effluent. Duke Energy indicated that the dates were transcription errors in the comments and that the dates are noted

correctly in the summary sheet Duke Energy provided. Duke Energy confirmed that the latter of the two dates should be used in all cases (e.g., 8/4/09 instead of 8/3/09).

8. Why does the spreadsheet omit the following observations that were included in the Duke Energy comments:

a. 7/14/10 (120 ng/L)

Duke Energy Response: Duke Energy noted this was a UWAG duplicate (from a 6-way split during the EPA sampling event). The result was inadvertently deleted and should be added to the spreadsheet.

b. 9/28/10 (242 ng/L)

Duke Energy Response: Duke Energy noted this was a UWAG duplicate (from a 6-way split during the EPA sampling event). The result was inadvertently deleted and should be added to the spreadsheet.

c. 11/2/10 (251 ng/L). Note that the spreadsheet shows 343 ng/L on this date. Is the 343 a data entry error? If not, please provide the laboratory report for this result.

Duke Energy Response: Duke Energy indicated that the 251 ng/L result is an average of two samples (i.e., 248 and 254 ng/L). This sample was taken during EPA's sampling event, where there were several splits. The 343 ng/L result was from a UWAG split for which Duke Energy does not have a laboratory report. EPA noted that UWAG did not report this value. Duke Energy will confirm with UWAG on this result.

Action Item: Duke Energy will follow up with UWAG on the reported 343 ng/L value on 11/2/10.

9. Why does the spreadsheet show 43 ng/L on 5/24/11, compared to Duke Energy & UWAG comments showing 20 ng/L? Is this actually the observation in Duke Energy comments for 6/28/11? Note that there is no laboratory report for 6/28/2011, so is the 43 ng/L a data entry error?

Duke Energy Response: Duke Energy agreed that the 43 ng/L result belongs on the 6/28/2011 and the non-detect value at 20 ng/L belongs on 5/24/2011.

10. Please confirm that for the FGD WWT effluent (Outfall 608), Duke Energy provided the average of two total mercury samples in the spreadsheet (i.e., average of native sample and duplicate). Based on a review of the laboratory reports, EPA found the following discrepancies:

a. The average value for 10/2/2009 should be 83.15 ng/L (instead of 84.95 ng/L).

Duke Energy Response: Duke Energy confirmed that the correct value is 83.15 ng/L

b. The values provided for 1/3/2013, 7/2/2013, 10/2/2013, and 6/2/2011 for Outfall 608 only account for the native sample and do not account for averaging the duplicate result. EPA believes the following values should be used:

- i. 1/3/2013: 48 ng/L (instead of 50 ng/L);
- ii. 7/2/2013: 245 ng/L (instead of 250 ng/L); and
- iii. 10/2/2013: 265 ng/L (instead of 260 ng/L).

- iv. 6/2/2011: 80.5 ng/L (instead of 79 ng/L). Additionally, in the analytical data table, the RL is reported as 0.5 ng/L and the dilution factor is reported as 1. However, in the laboratory

report, the native and duplicate sample for Outfall 608 both have a RL of 10 ng/L and a dilution factor of 20. Which RL and dilution factor values are correct?

Duke Energy Response: Duke Energy confirmed that the EPA revised values are correct. Duke Energy also confirmed that the RL is 10 ng/L and DF is 20.

11. See the observations on 7/2/13 (250 and 33). The laboratory report shows that the 33 ng/L result is for dissolved mercury (spreadsheet says total Hg); the total mercury value should be 245 ng/L (average of 240 and 250). (Also see 10.b.ii above)

Duke Energy Response: Duke Energy confirmed that the 33 ng/L result should be for dissolved mercury.

12. The sample value for 4/2/2013 of 0.5 ng/L for the FGD WWT effluent (Outfall 608) is flagged as a non-detect value in the laboratory report but a detected value in the data table. Please confirm whether this should be treated as a detect or non-detect value.

Duke Energy Response: Duke Energy will confirm whether or not it is a detect or non-detect value at 0.5. This is an average value.

Action Item: Duke Energy will confirm the ND qualifier for 0.5 ng/L on 4/2/13 for the FGD effluent.

13. The value from 11/3/2009 for Outfall 608 is a rounded value. EPA believes the value should be 262.5 ng/L (instead of 263 ng/L).

Duke Energy Response: Duke Energy confirmed that the average 262.5 ng/L is correct. This value was rounded up.

14. The 57.95 ng/L total mercury value reported for effluent 9/1/2009 should be 9/21/2009. The spreadsheet is missing the actual 9/1/2009 result of 62.7 ng/L.

Action Item: Duke Energy will get a copy of the laboratory report.

15. The dilution factor and reporting limit (RL) for the Outfall 608 mercury data from 4/5/2011, 8/4/2011, and 9/2/2011 are different for the native and duplicate sample. For the 4/5/2011 and 8/4/2011 sample, Duke Energy provided the average analytical result but reported the RL and dilution factor for the native sample; but for the 9/2/2011 sample, Duke Energy provided the average analytical result but reported the RL and dilution factor for the duplicate sample. Please explain the reasoning for which RL and dilution factor were provided in the analytical data table.

Duke Energy Response: Duke Energy notes that they have problems averaging samples with different RLs. They would recommend using the dilution factor from the laboratory report for the original sample.

16. Please explain why FGD WWT influent (Outfall 601) results for samples analyzed with the SWA846 7470A method were not included in the analytical data table.

Duke Energy Response: Duke Energy stated that they were using the 7470A results as an alternative method to account for the high TDS samples, but noted that method 7470A is not an approved method.

Duke Energy stated that they did not include the method 7470A results in the spreadsheet because method 7470A is not a NPDES-approved method.

17. What values should be used to represent the FGD WWT Influent (Outfall 601) on 8/3/2011?
- For Unit 7, the analytical data table includes 320,000 ng/L and includes a note from Joe Potts that value "was 300,000 TA reports show 320,000." However, from EPA's review of the laboratory report, there was one result using EPA Method 1631 at 300,000 ng/L and one result using Method 7470A at 360 ug/L.
 - For Unit 8, the analytical data table includes 290,000 ng/L. EPA notes there are four results for Unit 8 total mercury:
 - Native sample using 1631E: 290,000 ng/L
 - Duplicate sample using 1631E: 320,000 ng/L
 - Native sample using 7470A: 410 ug/L
 - Duplicate sample using 7470A: 420 ug/L

On the Table 1 summary of the laboratory report (see page 4 of PDF), there is a footnote designation for the 1631E Unit 8 samples stating that "after collection of samples, URS was informed that both Unit 7 and 8 were being processed through Station 601." Which mercury results are most appropriate for use in representing the Unit 8 sample results?

Duke Energy Response: Duke Energy stated that for Unit 7, 300,000 ng/L is the correct result and confirmed that the Joe Potts note was incorrect. For Unit 8, Duke Energy recommends not using the data because the 7470A data are not from an approved method and for the 1631E results, Duke Energy doesn't know the fraction of which units are being represented.

18. The dilution factor for the FGD WWT Influent (Outfall 601) on 9/3/2013 for Units 7 and 8 are listed as 100,000 in the analytical data table, but the laboratory report shows the dilution factor as 100. Based on the reporting limit for the samples (20,000 ng/L) and the laboratory reporting limit for a dilution factor of 1 (0.5 ng/L), it seems that dilution factor should be 40,000. Which dilution factor is correct?

Action Item: Duke Energy will go back to the laboratory to check their calculation for this sample.

19. We observed three data points at substantially higher concentrations relative to the other effluent values. What was happening with plant processes, coal sources, treatment system operation? What actions were taken in response to these observed concentrations?
- 9/1/10 (640.5)
 - 7/6/11 (675)
 - 10/4/11 (770)

Duke Energy Response: Duke Energy noted that the process operations seem within normal ranges. Additionally, Duke Energy noted that when they identify these types of excursions, they have to go back to the station to determine if there were any process changes during those periods. Therefore, they are waiting 2-3 weeks before they get the sample results back, then they have to coordinate with the station on what changes were occurring at that time, so it becomes difficult to pinpoint the source of

the spike in concentration because sometimes the concentration goes back down by itself, without a process change. Duke Energy noted that they are not operating the system to reach any specific metals concentrations, but rather, the operators evaluate the pH, turbidity, and TSS to make sure there is good settling and clarification. Duke Energy noted that if they see high results, they try to correlate turbidity to TSS and make sure that the instrumentation is working properly. Duke Energy noted that the organosulfide dosage is based on typical influent concentrations and they pay attention to the dosage and evaluate whether adjustments are needed. Operators do day-to-day adjustments based on TSS, turbidity, and pH.

Duke Energy stated that they looked into the mercury analyzer used at We Energies' Pleasant Prairie Power Plant, but noted that it requires laboratory technicians that need experience working with the samples.

Duke Energy also noted that they have made changes to the type of organosulfide (i.e., changed from TMT-15 to Nalmet 1689) because they were trying to make improvements where data were available to support the improvements.

20. Please provide the laboratory reports for the mercury data in the "USEPA Analytical Data Table MFS #26_14.xlsx" file for the following dates (these reports were not included in the disk): 9/21/2009 (only summary page provided), 7/12/2010, 7/13/2010, 7/14/2010, 7/15/2010, 7/16/2010, 12/7/2010, 1/5/2011, 1/14/2011, 2/1/2011, 9/26/2011, 3/1/2012, 7/31/2012, 8/1/2012, 8/8/2012, 8/9/2012, 2/4/2013, 2/5/2013, 3/4/2013, 3/5/2013, 5/1/2013, 5/2/2013, 5/8/2013, 6/3/2013, 6/4/2013, and 8/2/2013.

Duke Energy Response: Duke Energy stated that they will look for the laboratory reports, but they noted that they do not have access to UWAG's laboratory reports.

EPA asked Duke Energy for details about the target parameters (analytes and concentrations) for the FGD treatment system effluent. Duke Energy responded that they target maintaining a certain pH level that is intended to precipitate and remove metals, and they also monitor turbidity and TSS. Duke Energy does not operate the treatment system to target a specific effluent concentration for metals such as arsenic and mercury.

EPA also asked what actions the plant took to respond to elevated effluent concentrations, such as those observed for 9/1/10, 7/6/11, and 10/4/11. Duke Energy stated that the operators would have monitored turbidity levels.

At the end of the call, Duke Energy had three topics they wanted to discuss with EPA:

1. Duke Energy asked whether EPA has had conversations with SCANA regarding the pilot testing at the Wateree station? Duke Energy noted that SCANA is interested in sharing their experience with EPA, but wasn't sure if they could provide it to EPA because the comment period is closed.

EPA Response: EPA indicated that the comment period is closed, but EPA is happy to talk with people regarding the rulemaking.

2. Duke Energy stated that more guidance is needed for the analysis of FGD wastewater using Method 200.8. Duke Energy noted that commercial laboratories don't think they need to revise their protocols when analyzing FGD wastewater because they are following an approved method.

EPA Response: EPA acknowledged the comment.

3. Duke Energy requested additional notes that ERG may have on which unit blowdown (i.e., Unit 7 or 8) was collected during the EPA sampling event in July 2010 for sampling point 1.

ERG Action Item: ERG will provide Duke Energy with the requested information.

On May 15, 2014, following the conference call with Duke Energy, ERG sent an email providing Duke Energy with the information that was requested related to which unit was blowing down FGD purge at the time of sample collection during the EPA sampling event in July 2010. The email from ERG to Duke Energy is included in the record as DCN SE04331A2.

On June 11, 2014, EPA sent a follow-up email to Duke Energy requesting responses to the action items from the May 15, 2014 call (see DCN SE04331A3). On June 24, 2014, Duke Energy provided responses to the action items included in EPA's June 11, 2014 email. The following is a list of Duke Energy's correspondence with EPA (with associated DCNs):

- Email to Ron Jordan (DCN SE04331A4);
- Cover letter to Ron Jordan (DCN SE04331A5);
- Updated analytical data table for Miami Fort (DCN SE04331A6);
- Correction to Miami Fort laboratory reports for 2009/2010 (DCN SE04331A7); and
- Previously missing Miami Fort laboratory reports (DCN SE04331A8 through SE04331A49).

On June 24, 2011, EPA sent a follow-up email to Duke Energy with additional questions related to the other plants (i.e., Allen, Belews Creek, Cliffside, Mayo, Roxboro) for which Duke Energy had provided responses to EPA's original data request. The following is a list of EPA's correspondence with Duke Energy (with associated DCNs):

- Email to Nathan Craig (DCN SE04331A450); and
- EPA follow-up questions for remaining Duke Energy plants (DCN SE04331A51).

On July 9, 2014, Duke Energy provided initial responses to the questions that EPA sent on June 24, 2014. The following is the list of Duke Energy's correspondence with EPA (with associated DCNs):

- Email to Ron Jordan (DCN SE04331A52);

- Duke Energy Responses to June 24 Questions (DCN SE04331A53);
- Cliffside Electronic Data Delivery Sample ID Correction (DCN SE04331A54); and
- UWAG bottom ash transport water sampling protocols (DCN SE04331A55).

On July 24, 2014, Duke Energy sent updated responses to the questions that EPA sent on June 24, 2014. The following is the list of Duke Energy's correspondence with EPA (with associated DCNs):

- Email to Ron Jordan (DCN SE04331A56); and
- Duke Energy Updated Responses to June 24 Questions (DCN SE04331A57).
- Miami Fort Station bottom ash sample laboratory reports (DCN SE04331A58 through SE04331A461);
- Allen Steam Station FGD wastewater treatment laboratory reports (DCN SE04331A62 through SE04331A219); and
- Belews Creek Steam Station FGD wastewater treatment laboratory reports (DCN SE04331A220 through SE04331A368).